Chapter 10
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Forecast of Residential Resource Needs

At some point, every juvenile justice agency is asked to estimate the future demand for its services, whether this includes detention and commitment space or treatment programs and community supervision. Projections of future demand are essential during debates over agency budgets, staffing levels, construction plans, and program locations. Efforts to anticipate future demand for facilities and services are generally known as *forecasting*. Forecasting efforts typically involve the analysis of demographics, juvenile crime, and juvenile justice caseloads. Historical patterns are extended into the future in order to assess potential changes and the range of possible resource demands.

DELIVERABLE 2

Production and disclosure to the Department of the forecasting model with methodology and assumptions used to arrive at the long-term forecasts.

Even the best statistical models, however, will never fully account for the complex forces that actually shape the demand for juvenile justice resources (Butts and Adams 2001). Over the past two decades, demographic shifts and juvenile crime trends have usually turned out to be far less important than changing patterns in juvenile justice policy and practice. Unfortunately, there are no convenient data sources for tracking policy preferences and juvenile justice practices, particularly at the state or local level. This information can only be obtained by gathering the opinions and beliefs of individual practitioners and decision makers. Elected officials, agency administrators, and justice professionals have unique access to information about future trends, and they are ultimately accountable for the policy and budgeting decisions that depend on forecasting. Their expertise must shape the methods and purposes of forecasting.

Development Services Group, Inc. and its subcontractor, the Urban Institute of Washington, D.C., designed and managed a forecasting effort that combined statistical analysis with the expertise and judgment of DJS leaders and other Maryland juvenile justice officials. The forecasting effort relied upon the Urban Institute's "Practical Forecasting" model, which provides decision makers with a systematic method of blending statistical analysis with managerial and policy judgment in order to produce estimates of future need for programming and confinement capacity. Rather than basing projections on data alone, the "Practical Forecasting" model uses data to inform a decision-making process that draws upon the expertise of those closest to the problems of supply and demand—practitioners and decision makers. This combination of judgment and data was used to generate projections of future juvenile justice needs in the State of Maryland.

FORECASTING MODELS

To understand juvenile justice forecasting, it is necessary to distinguish between the technical methods of forecasting and the purposes of forecasting (Sabol and Pollack, 1998). Many people conceptualize forecasting as "getting the right number." This limited view of forecasting assumes that an analysis is inferior if it produces a number or estimate that turns out to be different from actual need in the future, or if it becomes irrelevant after a change in policy. Forecasting, however, should not be viewed as an exercise in simple prediction. In fact, there will never be an accurate method of predicting future demand for commitment resources beyond the very short term.

The goal of forecasting is not to predict the long-term future; it is to react more quickly to future trends as they emerge in the short term. A forecasting analysis is simply a conditional statement of future justice populations *provided that* our assumptions about what generates those populations persist into the future (Chaiken and Carlson, 1988). Forecasting should be used to understand why actual populations turn out to be different from forecasts, and in particular, to track the role of policy changes and other unforeseen forces that shape the demand for confinement space and program resources.

The technical methods for forecasting corrections populations fall into several categories. Sabol and Pollack (1998) identified four projection methods: 1) microsimulation; 2) disaggregated flow models; 3) statistical models; and 4) mathematical models.

1. Microsimulation models project the movement of individual entities through the justice system using individual-level data. These models offer a great deal of flexibility in forecasting under various assumptions, as they retain information about each individual in the system. Individual-level data can then be aggregated into forecast categories at the end of the simulation. Very few juvenile justice agencies have the detailed data necessary to support microsimulation models.

2. Disaggregated flow models generate projections based on the movements of groups through corrections systems. They project future populations based on rates of flow between events or stages. These rates can be viewed as parameters and therefore varied for use in the simulation (Blumstein, Cohen, and Miller 1980).

3. Statistical models use methods such as time-series (e.g., ARIMA) or various forms of regression analysis to project future resource needs based on trends in juvenile justice variables. Time-series models generate projections based on past values of the variable to be projected. Regression models project based on estimated relationships between the variable to be projected and other causally related variables. Regression methods also require that the values of the independent or causal variables be forecast (Stollmack 1973).

4. Mathematical models range from simple growth rate projection methods to more sophisticated stochastic models (Barnett 1987). The typical growth rate models project by adding a constant amount or by multiplying by a constant growth rate. The more sophisticated stochastic models incorporate parameters that relate in-flow to out-flow and model the length of stay in corrections facilities.

Of the four classes of models, microsimulation models offer the greatest flexibility and power in projecting populations under various assumptions about policy and flows into the corrections

systems. However, microsimulation models also require the greatest amount of data. They require a micro-level database with detailed system-navigation information about individual offenders. In most state juvenile justice systems, this requirement cannot be met. For national-level projections, this requirement will never be met.

If microsimulation models process identical individuals as groups, they are essentially functioning as flow models, the next class of models in order of flexibility (Rhodes, 1990). In other words, if the database contains information only about groups of offenders and a microsimulation model is used to forecast, the exercise is *exactly* the same as a disaggregated flow. Some well-known projection models operate in just this fashion. For example, the "Prophet" model developed by the National Council on Crime and Delinquency (NCCD) is a flexible model for forecasting, and it can be adapted to the system under consideration. However, most juvenile justice systems do not have the micro-level data needed for forecasting in this manner. Under such circumstances, the NCCD model operates as a disaggregated flow model.

The last two models, statistical and mathematical, are also used frequently in commitment forecasting. Both can produce quantitative analyses that may appear rigorous to non-researchers, but they can both suffer from the flaw of false accuracy. No matter how sophisticated a quantitative forecasting analysis may appear, it is based on assumptions about future conditions that are almost never correct. There are simply too many variables in the juvenile justice environment for any analysis to be able to chart the future based upon past trends in a few key variables. One of the major sources of change that is not readily amenable to quantitative analysis is unexpected development in juvenile justice policy.

Bringing in Policy

To improve the effectiveness of forecasting and to broaden its role in the policy-making process, forecasters and corrections decision makers in some states have reorganized the forecasting process to create a "consensus approach." In these systems, forecasting involves a "consensus committee" that includes policy-makers and legislators, as well as forecasters (Sabol and Pollack, 1998). The committee meets to review forecasting assumptions, to develop plans for monitoring forecasts, and to learn from forecasts about the impacts of policy and legislation. This approach also leads to greater accuracy in forecasting. Approaches to forecasting that do not incorporate a procedure for bringing together policy-makers and forecasters to review assumptions and learn from forecasts run the risk of limiting the usefulness of forecasts to simple and easily criticized projections of future populations that are rooted in current conditions. Further, they are limited in their ability to provide a framework for learning about the effects of policy on future populations.

Many factors affect the demand for juvenile justice programming and confinement space. In the most basic sense, the demand for resources is a function of three variables: the number of juveniles referred to the system, how those juveniles are processed while they are in the system, and how long they stay in the system. These factors, in turn, are affected by a large number of other forces. The number of juveniles referred to corrections and detention is related to the number of juveniles who commit law violations. The number of juveniles who commit law violations is a function of an abundance of other variables related to individual, family, and community factors.

Once juveniles come into contact with the juvenile justice system, there are a variety of laws, policies and procedures that govern their handling and that determine the rate at which they are referred to various programs and placement settings. The preferences and decisions of juvenile justice agencies and the individuals involved in handling each youth factor heavily in the demand for juvenile corrections and detention resources.

The length of time juveniles spend in the system is related to the speed with which the juvenile court is able to complete adjudication and disposition hearings, the public safety threat presented by offenders, the seriousness of their illegal behavior, the availability of alternative forms of supervision and control, and pressures that may exist to move juveniles out of a facility in order to free space for new admissions. In theory, it would be possible to predict the different effects of all of these variables on the ultimate demand for juvenile detention and corrections resources. In practice, however, those seeking to estimate future demand may need to make some assumptions about the effects of these and other variables because the data necessary to actually monitor their effects are unlikely to ever be available. At best, demand estimates must make assumptions about their effects by examining historical practices, where such information is available.

Finally, depending on the local context, individual-level variables, such as the current offense, criminal history, and other personal characteristics may affect juvenile justice decisions in different ways. In communities where the rate of juvenile crime is low and juvenile offenses are usually minor, some property offenses may be considered relatively serious breaches of community standards. This may encourage decision makers to detain juveniles charged with offenses that in other settings would not result in detention. In another jurisdiction, the same offenses might be handled with less severity and only more serious and violent offenses result in secure detention or long-term placement. Any competent forecasting effort must contend with both the variation and volatility in policy and practice.

The Practical Forecasting Model

The Urban Institute's Practical Forecasting approach relies on an easy-to-use mathematical forecasting model that projects the number of young offenders expected to enter juvenile justice programs in future months or years. However, the model also draws upon the judgment and experience of juvenile justice decision makers in addition to researchers and data analysts. Juvenile justice officials can use the model, which is available free on the Urban Institute's website, to create forecasting scenarios based on varying assumptions about future trends in youth populations, juvenile crime, and justice policies. The results can be displayed during forecasting meetings and alternate forecast scenarios can be re-calculated and shared immediately.

The Practical Forecasting model simplifies the statistical part of forecasting while increasing the breadth and diversity of human judgment available for decision-making. The policy-relevant information held by agency managers, elected officials, and other community leaders can be critical to anticipating future trends in the demand for juvenile justice resources. Making choices about the construction of new secure facilities versus the expansion or maintenance of community-based programs is nearly always difficult and potentially political. One of the best ways to increase the role of empirical information in this debate is to involve elected officials and other leaders in the process of generating and interpreting that information. By using the Practical Forecasting website, juvenile justice agencies can involve a wider range of individuals

and groups in the forecasting process, including legislators, administrators, program managers, facility directors, law enforcement leaders, judges, prosecutors, and virtually anyone else concerned about the provision of program resources and secure confinement space.

These individuals can work together to create forecasting scenarios based on varying assumptions about future trends. With a computer projection screen and a live Internet connection, the impact of these assumptions can be displayed immediately to the entire group. Each member of the group can then propose "what if" questions, and forecast scenarios can be recalculated directly on the website and displayed to the group. In this way, a multi-agency forecasting team can learn to work within a common empirical framework and begin to think about resource planning in a more systematic fashion. Administrators and other officials can become more attuned to fluctuations in the demand for agency resources and to the various forces shaping that demand.

FORECASTING RESOURCE NEEDS IN MARYLAND

DELIVERABLE 4

Long-term forecasts of the implications of the ideal service delivery system and other external factors on population, program, and facility demand, including institutional and community-based residential services and nonresidential services for the next 5 years, the following 5 years, and as many 5-year periods as possible thereafter.

The Practical Forecasting model was used by an inter-agency group from the Maryland juvenile justice system to project future populations and the need for out-of-home placement resources across the State. The state and local officials involved in the forecasting effort met several times during the Fall of 2004 to discuss data about current juvenile justice populations and expected trends in policy and practice. The Urban Institute facilitated these meetings in collaboration with Development Services Group, Inc. The Practical Forecasting website was used to organize the data and policy assumptions of the forecasting group and the results were used to generate the detailed population forecasts presented below.

Structure of the Maryland Working Groups

To begin the Maryland juvenile justice forecasting effort, various state and local officials were identified and recruited for two working groups that met several times during the forecasting project: 1) a Data Group and 2) a Stakeholder Group. Several members from both groups were appointed to a joint Forecasting Committee, which was charged with overseeing and managing the forecasting process.

The Data Group was asked to organize the data elements necessary to use the Juvenile Forecaster website. Whenever actual data were unavailable for certain elements, the data work group was asked to devise a process for estimating the missing data. Typically, data group members for

juvenile justice forecasting efforts would include personnel from law enforcement, the courts, probation or court services, social services, drug and alcohol treatment providers, mental health agencies, and other allied organizations with responsibility for components of the juvenile justice system. For the Maryland project, most members of the Data Group were drawn from the administrative, research and planning divisions of the Department of Juvenile Services.

Members of the Stakeholder Group were recruited from the policy and management levels of the same divisions. Members could have included judges, program directors, court administrators, facility superintendents, police leaders, prosecutors, public defenders, and elected officials. The Stakeholder Group met independently of the Data Group. Stakeholders set the agenda for the forecasting effort and served as the primary audience and consumer of forecasting information. Final approval of official forecasting results rested with the members of the Stakeholder Group.

Management of the overall forecasting process was coordinated by the joint forecasting committee that was made up of members from both the Data Group and the Stakeholder Group. The forecasting committee served as the liaison between the two other groups, helping to formulate and share the forecasting agenda with the Data Group members and relaying any data shortcomings and analytical concerns to the Stakeholder Group.

Members of the Maryland Working Groups

Data Group

Janice Marquez * Asst. Secretary, Equal Justice and Policy, DJS	John Irvine * Director, Office of Research and Planning, DJS	Laskhmi Iyengar Office of Research and Planning, DJS
Mary Abraham, Director Grant/ Intergovernmental Relations, DJS	Neil Bergsman* CFO, Budget and Finance, DJS	Jennifer Moore, Deputy Director, MD Drug Treatment Court Commission
Larry Dawson Baltimore City Family League	Sgt. Ed O'Halloran Baltimore City Police Dept.	Elizabeth J. Wright, Chief Information Officer

Stakeholder Group

Kenneth C. Montague, Jr. Secretary, DJS	Stephen T. Moyer Acting Deputy Secretary, DJS	Carl Sanniti * Deputy Secretary, DJS
William Stewart Assistant Secretary, DJS	James Green * Baltimore City Police Dept.	Vicky Mitchell * Area Director, DJS
Delmas Wood Area Director, DJS	Vickie Colter * Assistant Secretary, DJS	James McClafferty Area Director, DJS
Al Robinson Capital Planning	Ronald Lippincott Dept. of Budget and Management	Simon Powell Legislative Analysis
Joyce Wright * State's Attorney's Office	Elizabeth H. Lewis * Public Defender's Office	Rich Friedman Annie E. Casey Foundation

*Member of the Joint Forecasting Committee

Forecasting Meetings

During November 2004, the members of the forecasting working groups met several times to develop the population forecasts discussed below. The initial task of these meetings was to identify and organize data that could be used to generate population forecasts. Once these data had been assembled, the groups met to enter the information into the Urban Institute's forecasting website and to review and revise the forecast results in open discussions. The meetings of the working groups occurred according to the following schedule:

Meeting 1	November 10	60 minutes	Stakeholder Group
Meeting 2	November 10	90 minutes	Data Group
Meeting 3	November 12	2 hours	Joint Forecasting Committee
Meeting 4	November 16	2 hours	Data Group
Meeting 5	November 16	60 minutes	Joint Forecasting Committee
Meeting 6	November 22	2 hours	Joint Forecasting Committee
Meeting 7	November 23	3 hours	Stakeholder Group

Forecasting Tasks

Early in the forecasting process, the members of the Data Group were asked to select the most appropriate data matrices for each facility or program type likely to be included in the forecast — e.g., one matrix for secure commitment, another for residential treatment, detention, etc. The rows of each matrix represented important offender groups within that facility or program type (e.g., males and females). The columns in the matrix represent the key data elements required for forecasting.

Defining Offender Groups

Within each data matrix, the working group members were asked to classify offenders into groups that would be most relevant for program operations and system management (service delivery, facility security, transportation, building management, etc.). Offender groups were differentiated according to other offender categories, such as gender and geographic region of the state. The rows in each data matrix contained these categories. The number of rows depends on how many categories are used for each offender group. A forecasting scenario that divides offenders into groups based only on DJS Area would require just five different categories:

Row 1 — Area 1
Row 2 — Area 2
Row 3 — Area 3
Row 4 — Area 4
Row 5 — Area 5

A scenario that divides offenders according to gender in addition to DJS Area would require ten rows:

Row 1 — Area 1 males
Row 2 — Area 1 females
Row 3 — Area 2 males
Row 4 — Area 2 females
Row 5 — Area 3 males
Row 6 — Area 3 females
Row 7 — Area 4 males
Row 8 — Area 4 females
Row 9 — Area 5 males
Row 10 — Area 5 females

To keep forecasting data matrices from becoming too large, forecasting efforts must use the smallest possible set of population characteristics to distinguish offender groups and they should include only those characteristics thought to be essential for planning the capacity and distribution of placement and supervision resources. Some population characteristics that would be highly salient for research and evaluation efforts (e.g., race, ethnicity, family composition, school status, etc.) may not be as critical for forecasting. Other characteristics (e.g., female delinquents) may occur in numbers that are sufficiently low as to make them unsuitable to being broken further into subgroups. The Maryland forecasting groups elected to use data matrices that collapsed all females into one statewide offender group while breaking out males into the five DJS Areas. Thus, most of the data matrices employed in this analysis contain six offender groups, as seen in the example below.

SAMPLE DATA MATRIX

	Forecasting Data Elements						
Offender Groups	Starting Pop.	Admission Rate	Length of Stay	Cost per Day	Recidivism*	Change in Admissions	Change in ALOS
Area 1 Males	985	1900/yr	188	$65	28%	4%	1%
Area 2 Males	744	1100/yr	250	$60	30%	2%	1.8%
Area 3 Males	352	375/yr	355	$120	52%	-1%	2%
Area 4 Males	684	2900/yr	85	$25	20%	1%	-1%
Area 5 Males	562	1150/yr	180	$40	25%	1.5%	8%
Statewide Females	259	1000/yr	90	$20	38%	1.8%	-7%

Elements provided by juvenile justice agencies using real data or estimates.

Elements developed by forecasters in discussions of future scenarios and informed by statistical analysis.

*** Recidivism estimates are not essential for forecasting population trends but may be helpful for fiscal analysis.**

Compiling Data Elements

The first five elements in each data matrix can usually be collected in some form using real data from juvenile justice agencies. As much as possible, each element in these data matrices was completed using real data. If certain elements for a particular program type could not be filled in with actual data, they were estimated, either by the forecasting working groups or by other individuals and agencies in the best position to guess.* The extent of estimation needed for any particular forecasting effort varies according to the number and variety of forecast programs and the number of offender groups involved.

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*The scope of a forecasting effort and the number of programs to be projected should be determined by policy and management concerns and not be constrained by data availability. Estimating a missing data element is better than omitting an important element from a forecasting scenario.

Each of the following data elements were collected and organized for use in the Maryland forecasting effort.

STARTING POPULATION

Starting Population refers to the number of juveniles currently in a facility or program – the number of youth currently on probation, currently receiving drug treatment, in a particular form of out-of-home placement, etc. Ideally, the starting population used by forecasters would be the actual number of juveniles in the population on the exact day a forecast is calculated. More practically, however, it is the most recent count of the population (as of last month, on the last day of the previous quarter, etc.).

ADMISSION RATE

The Admission Rate is the rate at which juveniles are added to a population, stated as the number currently being added per time-period (day, month, or year). The number of youth "admitted" to a population could mean the number of youth entering a facility, the number placed on probation, the number beginning treatment or supervision, etc.

LENGTH OF STAY

The length of time juveniles are expected to remain in the population after being admitted, measured as the average number of days between "admission" and "release." Although this estimate is used to quantify the current length of stay, it must be based on recent (i.e., past) measures of length of stay.

COST PER DAY

The average daily cost (in dollars) incurred by a facility or program for each juvenile served. This would usually be available as the per diem cost of services or placement. (Per diem charges do not usually account for capital or construction costs, so this measure of "cost per day" does not capture the total costs of services and placements. It is useful, however, in projecting the daily costs of supervision, treatment, and placement for juveniles in each forecast population group.)

RECIDIVISM

Some forecasting work groups choose to incorporate recidivism as a source of new admissions. In other words, if one-fifth of youth released from probation supervision are expected to return as new probation cases within one year, then growth in the probation population in year 1 should be expected to increase detention admissions in year 2. Definitions of recidivism vary, of course, but many forecasting efforts define recidivism as the percentage of youth re-arrested within 1 year of release or case closure. Others use shorter time frames (e.g., 1 month) or even different triggering events (e.g., re-adjudication or re-incarceration rather than re-arrest). Most juvenile justice systems maintain at least some data about recidivism, but few agencies will be able to

generate separate recidivism measures for a large number of offender groups and many program types. When detailed information does not exist, it is acceptable to use a single recidivism estimate for multiple program types and offender groups.

The Maryland forecasting working groups elected *not* to include recidivism as one of the key data elements in this first forecasting effort, but it may be added to the analysis in subsequent iterations.

EXPECTED CHANGE IN ADMISSIONS

The final two data forecasting elements will never be measured with real data. They are projections, derived from the subjective beliefs and past experiences of the members of each forecasting committee. The most critical data element in any population projection is the extent to which the rate of admissions is expected to change in the future, expressed as a percentage. Whether this is over a period of weeks, months, or years, generating estimates of future admissions will never be an exact science. It is best to use a combination of statistical analysis, policy judgment, and the best guesses of practitioners.

EXPECTED CHANGE IN LENGTH OF STAY

Finally, forecasters should indicate the extent to which lengths of stay are expected to change in the future – expressed as a percentage change per time-period. As with the expected change in admissions, it is best to create these estimates using data about historical patterns but also considering policy judgments and the views of experienced practitioners.

Calculations Used in Juvenile Forecaster

Once all of the data elements were assembled, the Urban Institute's Practical Forecasting website—and the Juvenile Forecaster module on that website—was used to create population projections for each program type and each offender group. Population projections for time *t* are calculated by the Juvenile Forecaster module using the following equation:

$$P(t) = A(t) \cdot L(t) \cdot \left(1 - e^{-1/L(t)}\right) + P(t-1) \cdot e^{-1/L(t)}$$

The first term represents juveniles admitted between time *t-1* and time *t*, and the second term represents juveniles present at time *t-1* who have not been released by time *t*. The population at time 0 is the initial population parameter. Admissions are assumed to be a *Poisson* process, and individual lengths of stay are assumed to have an exponential distribution. Both admissions and length of stay can vary over time. *A(t)* is the admissions rate at time *t*. This is Ae^{rt}, where *r* is the % change in admissions during each time-period of analysis divided by 100. If the percent change is 0, this is the constant value *A*. Similarly, *L(t)* is the length of stay at time *t*. This is Le^{st}, where *s* is percent change in length of stay divided by 100. In traditional models, the equation is given in a non-recursive form with admissions and length of stay constant:

$$P(t) = A \cdot L + \left(P - A \cdot L\right) \cdot e^{-t/L}$$

If length of stay in this equation is replaced by a function of length of stay over time, the traditional model will overestimate population if length of stay is increasing and underestimate it if length of stay is decreasing. The Urban Institute's forecasting model uses the recursive form to estimate varying lengths of stay.

FORECASTING RESULTS

The various forecasting scenarios generated by the Maryland working groups projected only small increases in the average daily populations of out-of-home placements (including both post-disposition placements and detention), from 2,674 in 2005 to 2,850 in 2020 (see **table 10.1**). The 6.6% increase in average daily population suggests that DJS out-of-home placements are expected to grow faster than the state population of 10-19 year-olds, which the Maryland Department of Planning projects will decline by about 4.9% during the same period.

Table 10.1.
Forecast of Average Daily Populations (ADP) in DJS-Sponsored Placements, 2005-2020

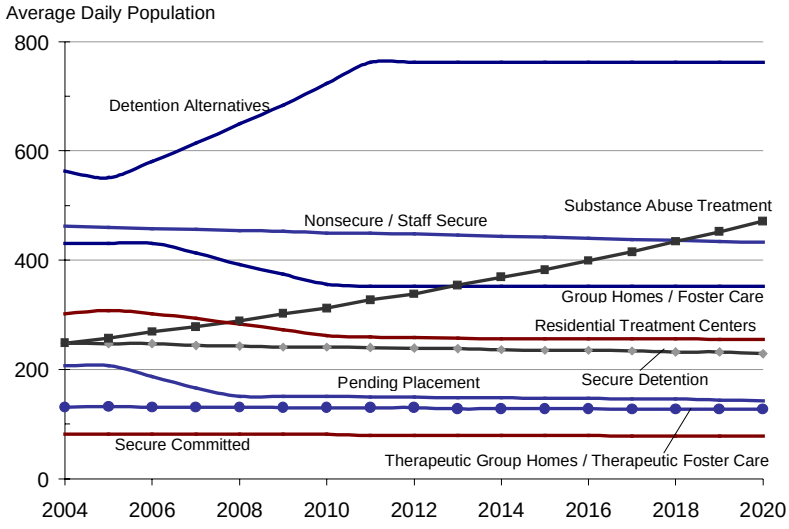
	FORECAST YEAR			
	2005	2010	2015	2020
Statewide ADP: TOTAL				
All Out-of-Home Placement	**2,674**	**2,706**	**2,783**	**2,850**
Detention	**798**	**964**	**997**	**991**
Secure Detention	247	241	235	229
Detention Alternatives	551	723	762	762
Pending Placement	**207**	**151**	**147**	**143**
Commitment	**1,669**	**1,591**	**1,639**	**1,716**
Secure Commitment	81	81	79	78
Residential Treatment Centers	308	262	256	255
Substance Abuse Treatment	257	312	382	471
Nonsecure / Staff Secure	460	450	442	433
Therapeutic Group Homes / Therapeutic Foster Care	132	130	128	127
Group Homes / Foster Care	431	356	352	352
Statewide ADP: MALE				
All Out-of-Home Placement	**2,337**	**2,358**	**2,425**	**2,488**
Detention	**694**	**838**	**866**	**861**
Secure Detention	216	211	205	200
Detention Alternatives	478	627	661	661
Pending Placement	**188**	**137**	**133**	**130**
Commitment	**1,455**	**1,383**	**1,426**	**1,497**
Secure Commitment	67	67	65	64
Residential Treatment Centers	235	191	186	186
Substance Abuse Treatment	222	271	335	416
Nonsecure / Staff Secure	448	438	430	422
Therapeutic Group Homes / Therapeutic Foster Care	109	107	105	104
Group Homes / Foster Care	374	309	305	305
Statewide ADP: FEMALE				
All Out-of-Home Placement	**337**	**348**	**358**	**362**
Detention	**104**	**126**	**131**	**130**
Secure Detention	31	30	30	29
Detention Alternatives	73	96	101	101
Pending Placement	**19**	**14**	**14**	**13**
Commitment	**214**	**208**	**213**	**219**
Secure Commitment	14	14	14	14
Residential Treatment Centers	73	71	70	69
Substance Abuse Treatment	35	41	47	55
Nonsecure / Staff Secure	12	12	12	11
Therapeutic Group Homes / Therapeutic Foster Care	23	23	23	23
Group Homes / Foster Care	57	47	47	47

Source: Maryland Juvenile Justice Forecasting Committee, December 2004

Most of the growth expected in the demand for placement resources occurs in two categories: detention alternatives and substance abuse treatment (see **figure 10.1**). The average daily population of youth in detention alternatives is forecast to increase from 551 to 762, a rise of 38%. The average daily population in substance abuse treatment is forecast to nearly double between 2005 and 2020, from 257 to 471.

In other categories, only small changes in average daily population are expected—and most of those changes are small declines due to the forecast drop in the juvenile population between 2005 and 2020. The average daily population of juveniles in secure committed and secure detention facilities, therapeutic foster homes and therapeutic group homes, and non-secure/staff secure facilities are forecast to decline slightly in the next 15 years.

Figure 10.1.
Forecast of Average Daily Populations in DJS-Sponsored Placements, 2005-2020



Source: Maryland Juvenile Justice Forecasting Committee, December 2004

Note: Forecast results represent a combination of trends suggested by demographic projections from the Maryland Department of Planning of the age 10-19 population and specific policy trends determined by Maryland juvenile justice officials.

Other types of juvenile placement are expected to change more significantly within the next 5 years due to policy changes. The number of juveniles in residential treatment centers, group homes and foster care, and those held pending placement are forecast to decline between 2005 and 2010, largely in response to the broader use of detention alternatives, substance abuse treatment, and home-based supervision. The average daily population of juveniles held pending placement is projected to drop 27 percent during this period. Conversely, the population of juveniles in detention alternatives and substance abuse treatment is expected to increase substantially.

Significant population changes were forecast mainly for the first few years of the projections. For example, the growth in detention alternatives was forecast to occur before 2011. The decline in group homes was expected to occur mainly by 2010, and in pending placement by 2008. Only substance abuse treatment was forecast to experience a change in population (growth) throughout the forecast period.

Figure 10.2 describes the trends in the two distinct categories of placement by DJS service Areas: 1) those in all forms of pre-disposition detention (including detention alternatives and pending placements) and 2) those in post-disposition out-of-home placements. The average daily population in pre-disposition detention is expected to increase 13% from 2005 to 2020, from 1,005 to 1,134. The growth in detention is evenly distributed across the five DJS Areas.

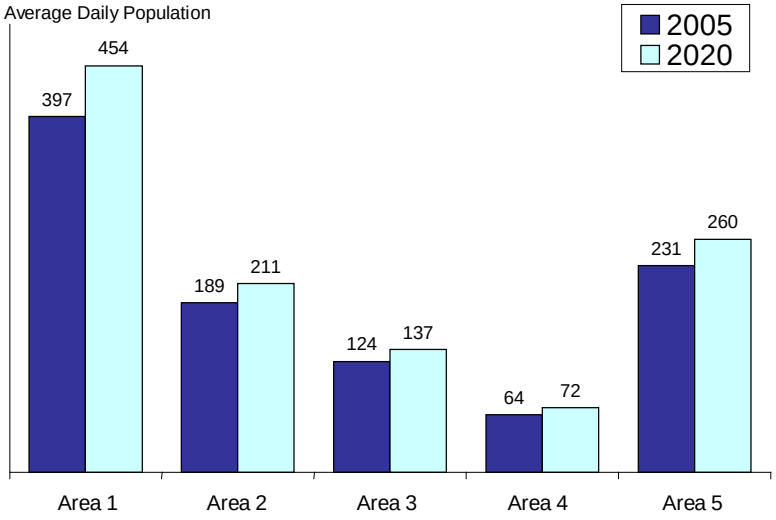
The forecast changes in post-disposition placements are more mixed. Between 2005 and 2020, the average daily population is expected to increase 2.7% overall, from 1,670 to 1,715 across all DJS Areas. Most of that increase, however, occurs in Area 5, which is forecast to have nearly 11% growth in out-of-home placements between 2005 and 2020. Areas 2 and 4 are expected to have slightly smaller daily populations in post-dispositional placement by 2020.

The different patterns of forecast population changes result in some subtle shifts in the overall DJS placement population (see **table 10.2**). While growth in the detention population is anticipated between 2005 and 2020, juveniles held in secure detention are expected to make up a smaller proportion of detention cases overall in 2020 (23%) than in 2005 (31%).

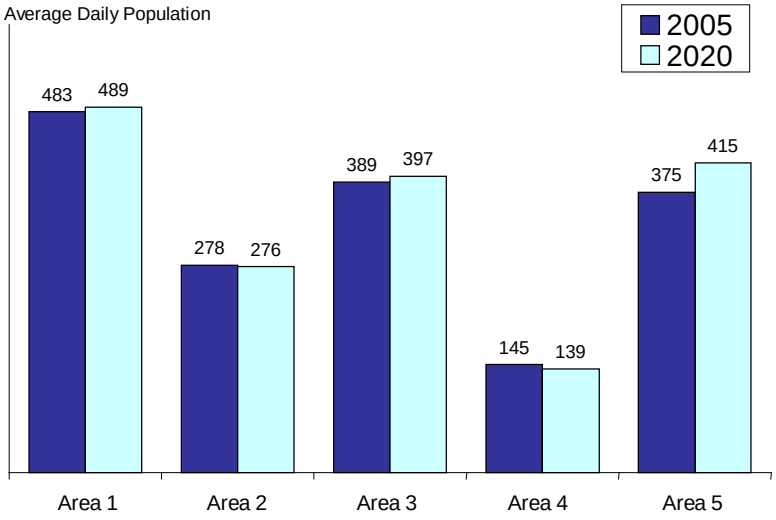
As a proportion of all youth in post-disposition placements, the substance abuse treatment population is charted to grow from 15% to 27% in the 15-year period from 2005 to 2020.

Figure 10.2.
Forecast of Average Daily Populations in DJS-Sponsored Placements by Service Area, 2005-2020

Pre-Disposition Detention
(includes secure detention, detention alternatives, and all youth held "pending placement")



Post-Disposition Out-of-Home Placement
(includes secure, staff secure, and non-secure facilities, as well as residential treatment, substance abuse treatment, foster care, group homes, therapeutic foster care, and therapeutic group homes)



Source: Maryland Juvenile Justice Forecasting Committee, December 2004

Note: Original forecast results apportioned only male juveniles among the DJS Areas. Female ADP was calculated only at the state level. To estimate area-specific ADP for females, this analysis assumed that the total number of female placements would be distributed among the DJS Areas in the same proportion as males.

Table 10.2.
Forecast of Average Daily Populations (ADP) in DJS-Sponsored Placements, 2005-2020

	Forecast Year			
	2005	2010	2015	2020
Percentage of Statewide ADP: TOTAL				
Detention	**100%**	**100%**	**100%**	**100%**
Secure Detention	31%	25%	24%	23%
Detention Alternatives	69%	75%	76%	77%
Commitment	**100%**	**100%**	**100%**	**100%**
Secure Commitment	5%	5%	5%	5%
Residential Treatment Centers	18%	16%	16%	15%
Substance Abuse Treatment	15%	20%	23%	27%
Nonsecure / Staff Secure	28%	28%	27%	25%
Therapeutic Group Homes / Therapeutic Foster Care	8%	8%	8%	7%
Group Homes / Foster Care	26%	22%	21%	21%
Percentage of Statewide ADP: MALE				
Detention	**100%**	**100%**	**100%**	**100%**
Secure Detention	31%	25%	24%	23%
Detention Alternatives	69%	75%	76%	77%
Commitment	**100%**	**100%**	**100%**	**100%**
Secure Commitment	5%	5%	5%	4%
Residential Treatment Centers	16%	14%	13%	12%
Substance Abuse Treatment	15%	20%	23%	28%
Nonsecure / Staff Secure	31%	32%	30%	28%
Therapeutic Group Homes / Therapeutic Foster Care	7%	8%	7%	7%
Group Homes / Foster Care	26%	22%	21%	20%
Percentage of Statewide ADP: FEMALE				
Detention	**100%**	**100%**	**100%**	**100%**
Secure Detention	30%	24%	23%	22%
Detention Alternatives	70%	76%	77%	78%
Commitment	**100%**	**100%**	**100%**	**100%**
Secure Commitment	7%	7%	7%	6%
Residential Treatment Centers	34%	34%	33%	32%
Substance Abuse Treatment	16%	20%	22%	25%
Nonsecure / Staff Secure	6%	6%	6%	5%
Therapeutic Group Homes / Therapeutic Foster Care	11%	11%	11%	11%
Group Homes / Foster Care	27%	23%	22%	21%

Source: Maryland Juvenile Justice Forecasting Committee, December 2004

DELIVERABLE 10

Cost analysis of resource shifting to achieve the ideal service delivery system.

Economic Impact

Forecast changes in average daily populations could produce significant changes in the average daily costs of all out-of-home placements, which are forecast to increase 56%, from approximately $461,000 in 2005 to more than $720,000 in 2020 (see **table 10.3**). However, almost all of this increase is the result of an expectation that inflation will increase 3% annually during this period. When inflation is factored out of this projection, the average daily cost for DJS is expected to decline slightly, to about $449,000 or about 2.6%. Much of the decrease is due to the changes in population that result from the mix of placements in 2020, which should be slightly less expensive than the current mix of placements. The forecasting working groups did not project changes in the average daily cost for any of the placement categories, except those that occur due to inflation. Therefore, changes in daily expenditures are expected to be due exclusively to changes in the average daily population, and in the costs associated with moving juveniles from one category of placement to another.

In inflation-adjusted terms, the costs to DJS from changes in the composition of juveniles within the system will yield across-the-board increases in costs by 2020. Only the 2020 pending placement costs are projected to be relatively similar to the 2004 costs, and even in that category, an increase of almost 8% is projected. Commitment costs are forecast to increase almost 58% during this period, and detention costs are forecast to increase about 69%. The largest increase for any single type of out-of-home placement will be costs associated with substance abuse, which are forecast to nearly triple.

Another approach to interpreting these data is to remove the adjustment for inflation, and consider all costs by category in 2004 dollars. This approach finds that most costs for DJS are forecast to decline by 2020. Across the major cost categories, only detention costs are forecast to increase over this period, and most of that increase is forecast to occur due to increases in costs for detention alternatives. Daily substance abuse treatment costs are expected to have the greatest increase of any out of home placement, increasing by almost 80%. Commitment costs decline slightly over this period, and pending placement costs decline by about one-third. The average daily cost of placement explains much of the forecast changes in total cost. The largest percentage change in average daily population occurs in substance abuse treatment, which almost doubles. However, the average daily population in the most expensive cost categories—residential treatment, secure detention and pending placement—are expected to decline over the period, yielding overall cost savings. The daily population of juveniles in detention alternatives—the least costly placement category—is expected to increase, yielding a net decrease in costs when placement of juveniles in this category replaces more expensive interventions.

Average Daily Costs in FY 2004

Placement Category	ADC	Placement Category	ADC
Detention Alternatives	$59	Substance Abuse Treatment	$177
Secure Committed	$166	Pending Placement	$177
Group Homes/Foster Care	$170	Therapeutic Group Homes	$221
Therapeutic Foster Care	$172	Secure Detention (Female)	$233
Non-Secure/Staff Secure	$172	Secure Detention (Male)	$243
Substance Abuse Treatment	$177	Residential Treatment	$260

Source: Maryland Juvenile Justice Forecasting Committee, December 2004.

Changes in costs to DJS are sensitive to changes in forecasting assumptions. For example, an increase in expected inflation from 3% to 6% would more than double expected costs, since those increases would compound each year. Changes in the distribution of juveniles within the system would also have major implications for costs, especially if movement between high- and low-cost categories was forecast. In addition, changes in timing have significant impacts on cost. For example, delaying the expected decrease in the flow of juveniles into pending placement until later in the forecast period would disproportionately increase costs, since higher early costs would be subject to compounding interest.

The forecast working groups did not project changes in ADC for any offender groups within placement categories, but they did project changes in ADP for each category. This implies that there will be no changes in economies of scale. For most service providers, some economies of scale exist; for example, if the population of securely committed juveniles increases as expected, with no changes in resource capacity, the cost per juvenile should decrease. Changes in ADCs resulting from changes in ADPs may need to be included in subsequent forecasts.

Table 10.3.
Inflation-Adjusted Forecast of Average Daily Cost (ADC) in DJS-Sponsored Placements, 2005-2020

	Forecast Year			
	2005	2010	2015	2020
Statewide ADC: TOTAL				
All Out-of-Home Placement	**$460,951**	**$512,458**	**$605,407**	**$720,129**
Detention	**$94,988**	**$120,503**	**$140,864**	**$160,976**
Secure Detention	$61,503	$69,569	$78,632	$88,832
Detention Alternatives	$33,485	$50,934	$62,232	$72,144
Pending Placement	**$37,738**	**$31,914**	**$36,015**	**$40,616**
Commitment	**$328,225**	**$360,041**	**$428,528**	**$518,537**
Secure Commitment	$13,851	$16,055	$18,153	$20,777
Residential Treatment Centers	$82,482	$81,339	$92,135	$106,392
Substance Abuse Treatment	$46,853	$65,939	$93,594	$133,779
Nonsecure / Staff Secure	$81,493	$92,420	$105,234	$119,512
Therapeutic Group Homes / Therapeutic Foster Care	$28,078	$32,024	$36,579	$42,051
Group Homes / Foster Care	$75,468	$72,264	$82,833	$96,026
Statewide ADC: MALE				
All Out-of-Home Placement	**$400,601**	**$443,594**	**$524,056**	**$624,901**
Detention	**$83,112**	**$105,394**	**$122,939**	**$140,571**
Secure Detention	$54,063	$61,223	$68,956	$77,989
Detention Alternatives	$29,049	$44,171	$53,983	$62,582
Pending Placement	**$34,274**	**$28,955**	**$32,585**	**$36,924**
Commitment	**$283,215**	**$309,245**	**$368,532**	**$447,406**
Secure Commitment	$11,457	$13,280	$14,936	$17,048
Residential Treatment Centers	$62,933	$59,297	$66,942	$77,604
Substance Abuse Treatment	$40,472	$57,274	$82,079	$118,157
Nonsecure / Staff Secure	$79,367	$89,955	$102,377	$116,476
Therapeutic Group Homes / Therapeutic Foster Care	$23,499	$26,715	$30,425	$34,917
Group Homes / Foster Care	$65,487	$62,724	$71,773	$83,204
Statewide ADC: FEMALE				
All Out-of-Home Placement	**$60,350**	**$68,864**	**$81,351**	**$95,228**
Detention	**$11,876**	**$15,109**	**$17,925**	**$20,405**
Secure Detention	$7,440	$8,346	$9,676	$10,843
Detention Alternatives	$4,436	$6,763	$8,249	$9,562
Pending Placement	**$3,464**	**$2,959**	**$3,430**	**$3,692**
Commitment	**$45,010**	**$50,796**	**$59,996**	**$71,131**
Secure Commitment	$2,394	$2,775	$3,217	$3,729
Residential Treatment Centers	$19,549	$22,042	$25,193	$28,788
Substance Abuse Treatment	$6,381	$8,665	$11,515	$15,622
Nonsecure / Staff Secure	$2,126	$2,465	$2,857	$3,036
Therapeutic Group Homes / Therapeutic Foster Care	$4,579	$5,309	$6,154	$7,134
Group Homes / Foster Care	$9,981	$9,540	$11,060	$12,822

Source: Maryland Juvenile Justice Forecasting Committee, December 2004.

Impact of Departures from the Forecast

Finally, the forecasts described above are based on assumptions about changes in parameters related to population size and costs. In terms of economic impact, two of those assumptions are particularly important: changes in ADP and changes in ADC. Population forecasts are not intended as predictions but rather as guides for understanding trends. In interpreting the results of any forecast, it is important to consider the possible effects of changes in key parameters. For example, what would be the possible effects if actual ADCs and ADPs were as much as 20% higher or lower than forecast in the next 5 years (see **table 10.4**)?

The first column of **table 10.4**, change in ADC, tests the overall impact on daily costs to DJS from a change in the average daily cost for each out-of-home placement category. In this column, the assumption is that placement costs will be affected by economies of scale. It is assumed that a change in the average daily population will not change the overall number of facilities or staff required to supervise the daily population. Therefore, a forecast increase in population will lead to the same amount of oversight being spread across more juveniles, lowering costs per juvenile. A decrease in ADP would cause the same amount of oversight being spread over fewer juveniles, increasing the cost per juvenile. For small changes in categories where services are directly provided by DJS, this assumption is quite likely to model practical responses to changes in population. To measure this assumption, ADCs were anticipated to change by 20% if the ADP changed.

Overall, the change in ADCs due to resources being spread more widely or more narrowly was relatively small. Increases in the number of ADPs in detention alternatives and substance abuse treatment will lead to some cost savings from the economies of scale. Decreases in the population in the other categories will lead to some cost increases. For example, 10 fewer juveniles will be held in non-secure/staff secure facilities in 2010 than in 2005 and costs would increase for this group by 20% ($34 each). Overall, if this assumption holds, costs will increase by about $3,000 a day for DJS.

The second column tests an assumption that the forecast changes in population are too small. Column 2 adds 20% to the previously forecast change in ADP to test the economic impact. This column makes no assumption about economies of scale, and uses future ADCs as forecast. This change will have the opposite effect from the economies of scale. An additional increase of 20% in ADP leads to increased costs, and an additional decrease in ADP leads to cost savings. For example, instead of 10 fewer juveniles in non-secure/staff secure facilities, a forecast would project 12 fewer juveniles, for an additional cost savings of $344. Overall, this will cause a slightly larger increase in costs than those associated with increases in ADCs, and will total more than $4,300 a day.

See **Appendix G** for additional detailed forecasting data charts.

Table 10.4. Forecast of Alternative Assumptions about DJS-Sponsored Placements, 2010

Statewide ADP: TOTAL	Change in ADC	Change in ADP
All Out-of-Home Placement	**$3,096**	**$4,259**
Detention	**($1,830)**	**$1,792**
Secure Detention	$288	$(238)
Detention Alternatives	($2,064)	$2,030
Pending Placement	**$1,785**	**$(1,982)**
Commitment	**$3,141**	**$4,449**
Secure Commitment	$0	$0
Residential Treatment Centers	$2,208	($2,392)
Substance Abuse Treatment	($1,715)	$9,735
Nonsecure / Staff Secure	$340	($344)
Therapeutic Group Homes / Therapeutic Foster Care	$78	$0
Group Homes / Foster Care	$2,210	($2,550)

SUMMARY

Forecasting efforts can take many twists and turns, and future forecasting efforts for the State of Maryland could develop estimates very different than those presented here. Each forecast should be seen as a projection of one possible future, and only by repeated experience with forecasting will the Maryland juvenile justice system be able to develop forecast results that are more sensitive to local conditions and the recent policy environment. In general, however, a practical, policy-oriented forecasting process should include structures and procedures something like those listed above.

As the work of forecasting in Maryland continues, it is recommended that the forecasting committee should keep these key points in mind:

Recommendation: **The Forecasting Committee should learn to routinely generate and use population forecasts; this is more important than the content or accuracy of any one forecast. An effective forecasting process is not necessarily expensive and does not have to require a large investment of time and personnel. Even nominal forecasting efforts may produce considerable improvements in the efficiency and effectiveness of juvenile justice planning. The most important improvement an agency can make in its forecasting process is not to increase its statistical sophistication, but to increase the number and diversity of key stakeholders involved directly in forecasting.**